TRM 1007

Surfing the MISP

A quick guide to the Motion Imagery Standards Profile

Current to MISP Version 6.2

The MISB

From 1996-2000, the DoD/IC Video Working Group (VWG) developed motion imagery standards and the principal document was called the Video Imagery Standards Profile and in 2000 became the Motion Imagery Standards Board (MISB) under the NGA Innovision Directorate, effectively establishing an official standards body responsible for reviewing and recommending standards for motion imagery, associated metadata, audio and other related systems for use within the Department of Defense, Intelligence Community, and United States Imagery and Geospatial System (DoD/IC/USIGS). The MISB is the primary agent for the Functional Management role of NGA with respect to motion imagery.

Motion Imagery is recognized by the Intelligence and Defense communities as a vital part of our current and future intelligence picture. As our ability to collect motion imagery and achieve persistent surveillance continues to grow, ensuring interoperability of motion imagery formats with other types of sensor outputs, and making that critical intelligence available to those who need to know becomes increasingly important.

Standards greatly increase the value of information. By providing an underlying "common language" for the sharing of information, standards foster breadth in knowledge and depth in intelligence. Nowhere are standards more crucial in realizing this added value than within the acquisition, processing, exploitation, and dissemination workflow processes for motion imagery rich-media assets.

Establishing standards for motion imagery encoding, metadata schemas and dissemination protocols in conjunction with compliance enforcement and testing helps prevent the proliferation of proprietary, stovepipe systems that are not interoperable. The MISB's mission is to unify the motion imagery workflow, effectively maximizing the value of MI assets for all stakeholders. Architecting the PED workflow within a standards-based foundation and guiding the development, acquisition, and implementation of tools, technologies and processes will position our Community to create solutions that have far greater value for the warfighter.

Working Groups

Advanced Compression Working Group (ACWG)

Serves to identify and recommend commercially standardized motion imagery compression technologies for the DoD and the Intelligence Community.

Advanced Motion Imagery Working Group (AMIWG)

Addresses advanced motion imagery as a key enabling technology and supports the development of advanced motion imagery standards, Recommended Practices (RP) and Engineering Guidelines (EG) for advanced motion imagery collection, processing, exploitation, display and dissemination.

Format Working Group (FWG)

Provides direction and leadership in the development of RPs and EGs for utilizing commercially available technologies and protocols to ensure suitability to and compliance with Community requirements

Infrared Working Group (IRWG)

Develops Standards and RPs that support infrared motion imagery collection, processing, exploitation and dissemination

Interoperability Working Group (IWG)

Develops and mediates RPs and EGs to help ensure interoperability of motion imagery systems and products in commercial and Government arenas for the DoD and Intelligence Communities.

Metadata Working Group (MWG)

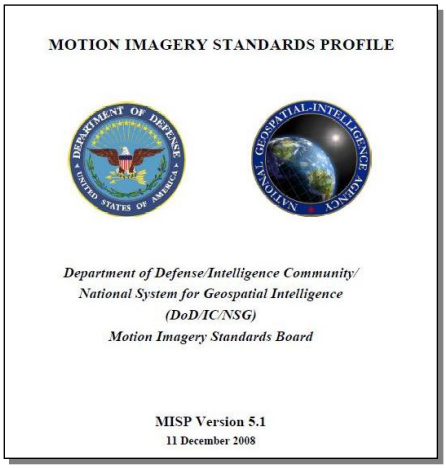
Develops RPs and EGs that foster metadata harmonization among motion imagery systems, leading to easily accessed, accurate motion imagery data that can be exploited by a wide range of users

Motion Imagery Tradecraft Working Group (MITWG)

A collaborative government/industry working group focused on the challenges of collection, storing, retrieving, processing and analyzing large volumes of motion imagery for the development of intelligence and for the support of military operations.

Interpretability, Quality, and Metrics Working Group (IQMWG)

The Interpretability, Quality, and Metrics Working Group (IQMWG) is the principal focus within the MISB for specific interpretability, quality and metrics (IQM) related issues.

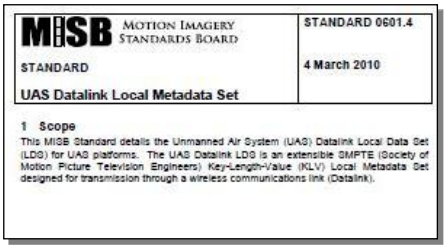

MOTION IMAGERY STANDARDS PROFILE

Department of Defense/Intelligence Community/ National System for Geospatial Intelligence (DoD/IC/NSG) Motion Imagery Standards Board

MISP Version 5.1
11 December 2008

MISP: The Motion Imagery Standards Profile (MISP) is applicable to all DoD/IC/NSG motion imagery systems that are subject to the DoD Joint Technical Architecture and the NSG Technical Architecture. All new motion imagery systems are required to be compliant with provisions of the MISP as soon as practical.

MISP compliance is based upon compliance to a specified approved version of the MISP (e.g. MISP Version (V) 5.1, MISP V5.0, etc.). The motion imagery system supplier specifies the MISP version for which it is seeking compliance along with three qualifications: the MISM-Level or IRSM-Level for compression, any metadata RP/EG/STDs, the file format for transport or storage, and any MISB timing specifications.


MISB MOTION IMAGERY STANDARDS BOARD

STANDARD 0601.4

STANDARD

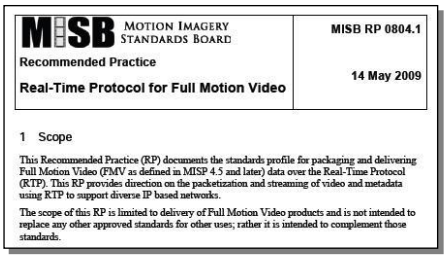
4 March 2010

UAS Datalink Local Metadata Set

1 Scope

This MISB Standard details the Unmanned Air System (UAS) Datalink Local Data Set (LDS) for UAS platforms. The UAS Datalink LDS is an extensible SMPTE (Society of Motion Picture Television Engineers) Key-Length-Value (KLV) Local Metadata Set designed for transmission through a wireless communications link (Datalink).

STANDARD: Where the MISP term STANDARD is used, the MISP item (chosen by specific MISB adoption, and approved by the NCGIS), mandates binding technical implementation policy, and as such, should be identified in Government procurement actions as a mandatory compliance item in order for vendor offerings to be accepted by the Government. Standards, as represented in this MISP are not considered voluntary for DoD/IC/NSG users and systems. They are mandatory.


MISB MOTION IMAGERY STANDARDS BOARD

MISB RP 0804.1

Recommended Practice

14 May 2009

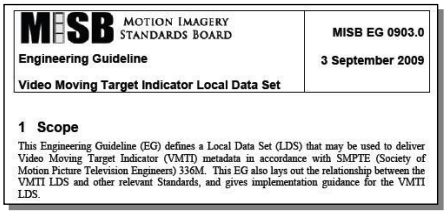
Real-Time Protocol for Full Motion Video

1 Scope

This Recommended Practice (RP) documents the standards profile for packaging and delivering Full Motion Video (FMV as defined in MISP 4.5 and later) data over the Real-Time Protocol (RTP). This RP provides direction on the packetization and streaming of video and metadata using RTP to support diverse IP based networks.

The scope of this RP is limited to delivery of Full Motion Video products and is not intended to replace any other approved standards for other uses; rather it is intended to complement those standards.

RECOMMENDED PRACTICE: Documents a recommended implementation or practice that further clarifies the implementation of a STANDARD or PROFILE in order to insure interoperability across DoD/IC/NSG systems. Recommended Practices chosen by specific MISB adoption should be considered to be a technical implementation policy, and as such, may be identified in Government procurement actions as a mandatory compliance item in order for vendor offerings to be accepted by the Government.


MISB MOTION IMAGERY STANDARDS BOARD

MISB EG 0903.0

Engineering Guideline

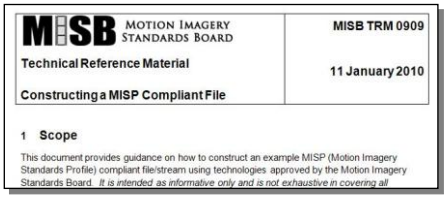
3 September 2009

Video Moving Target Indicator Local Data Set

1 Scope

This Engineering Guideline (EG) defines a Local Data Set (LDS) that may be used to deliver Video Moving Target Indicator (VMTI) metadata in accordance with SMPTE (Society of Motion Picture Television Engineers) 336M. This EG also lays out the relationship between the VMTI LDS and other relevant Standards, and gives implementation guidance for the VMTI LDS.

ENGINEERING GUIDELINE: Represents good engineering principals, and therefore, should be implemented if at all possible.


MISB MOTION IMAGERY STANDARDS BOARD

MISB TRM 0909

Technical Reference Material

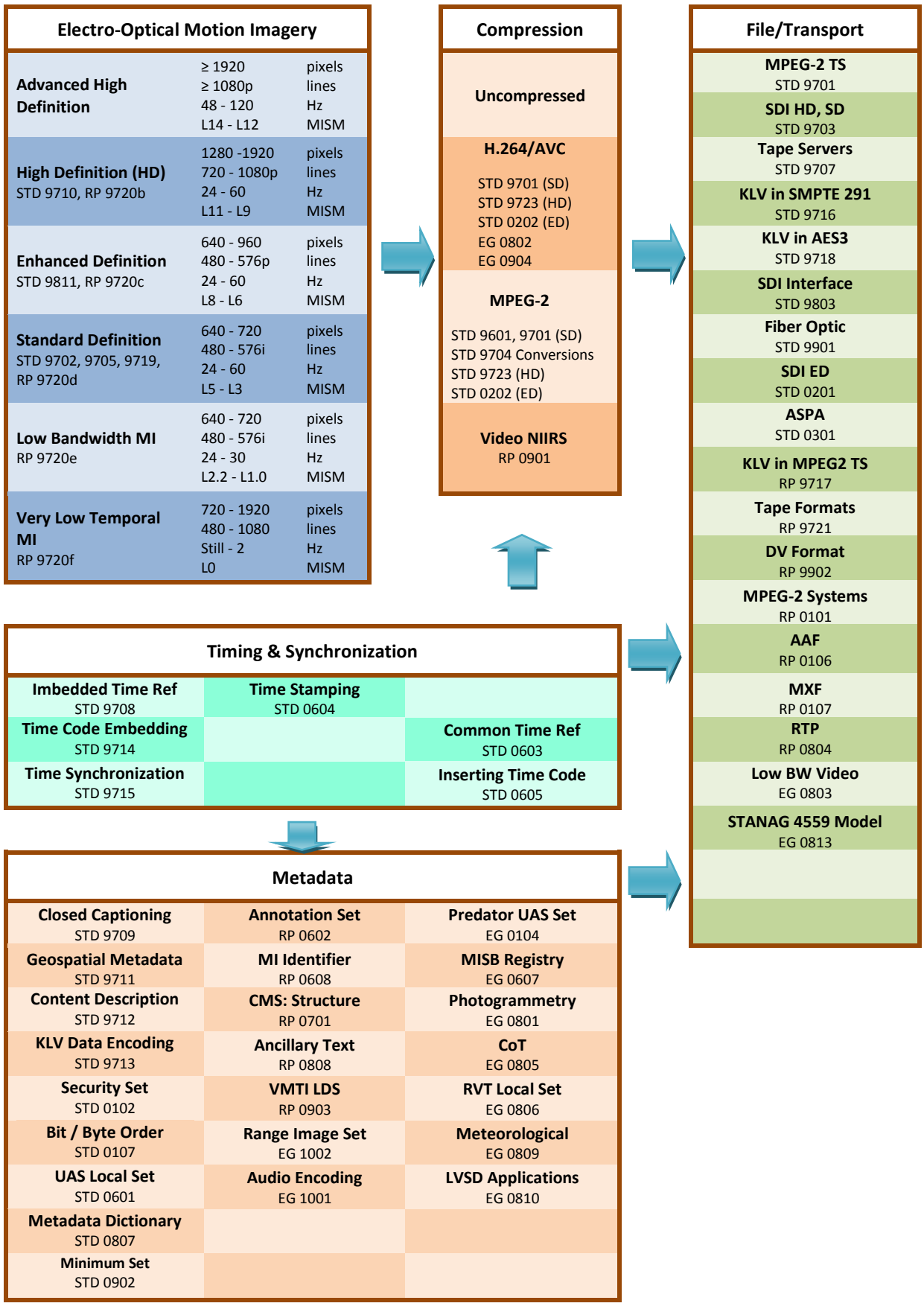
11 January 2010

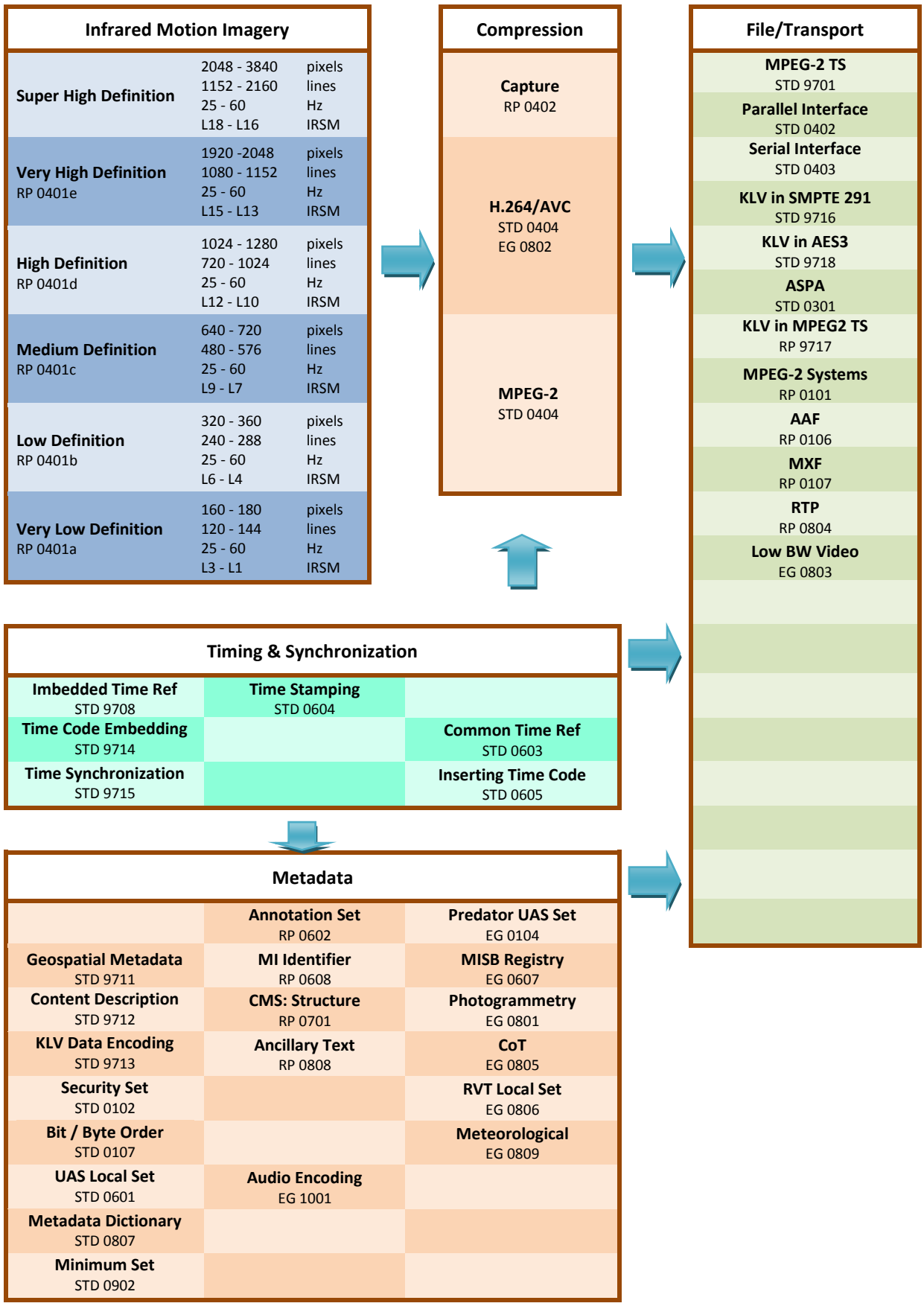
Constructing a MISP Compliant File

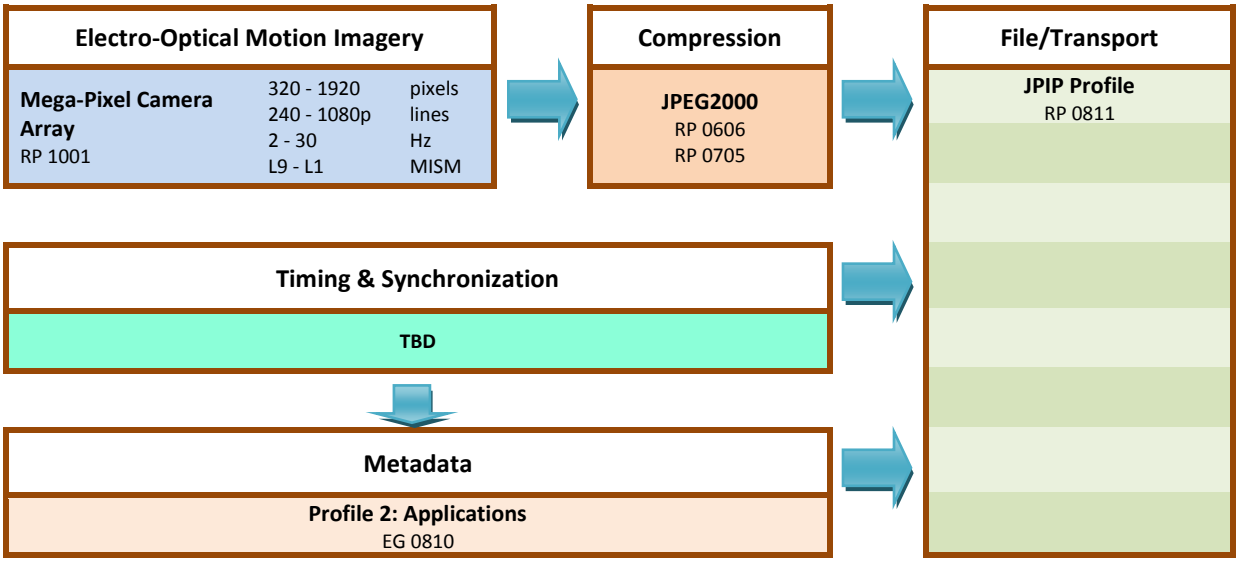
1 Scope

This document provides guidance on how to construct an example MISP (Motion Imagery Standards Profile) compliant file/stream using technologies approved by the Motion Imagery Standards Board. *It is intended as informative only and is not exhaustive in covering all*

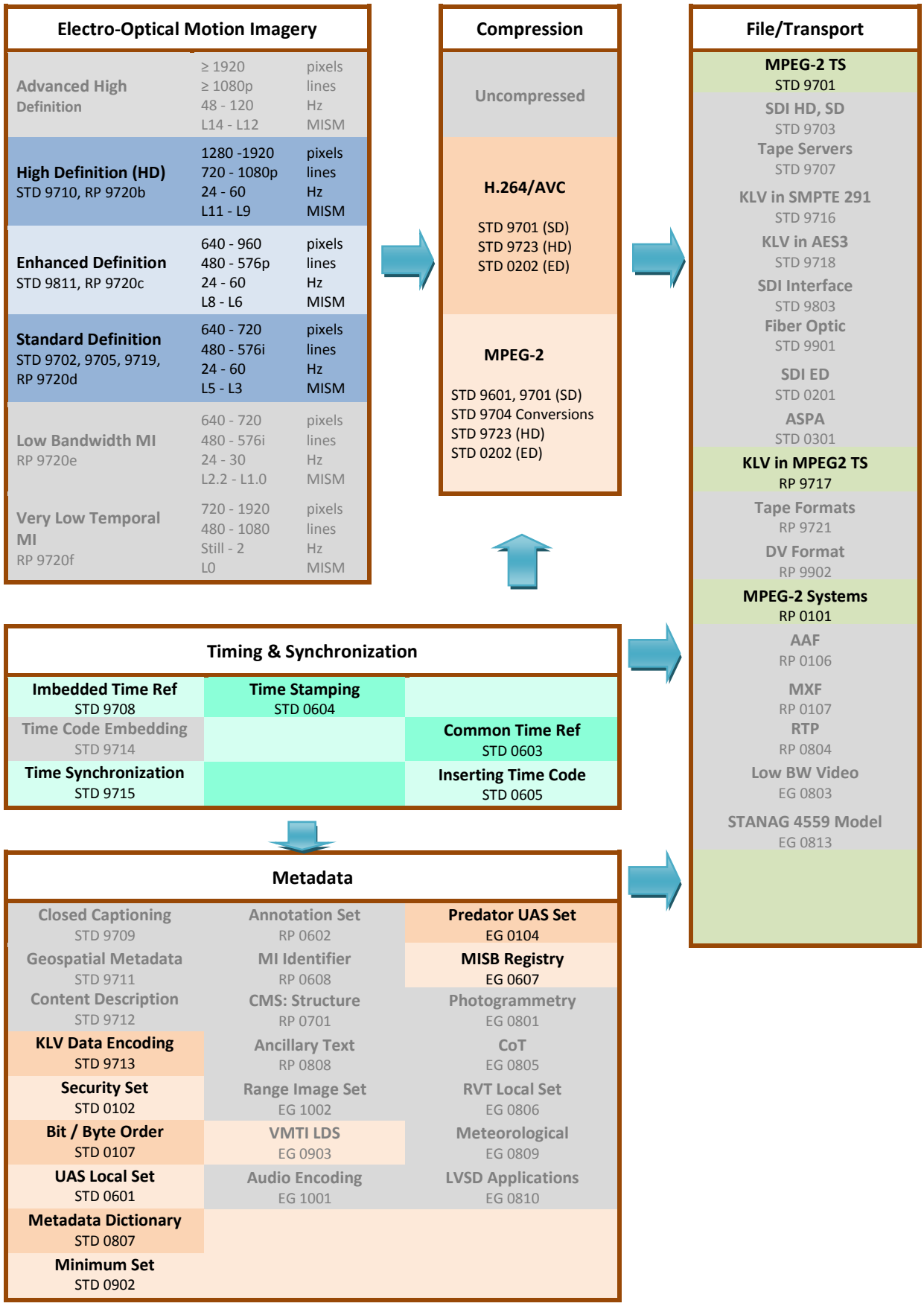
TECHNICAL REFERENCE MATERIAL: Documents information collected from research, technical exchange meetings, or study that does not result in a Standard, Recommended Practice, or Engineering Guideline, but contributes to further understanding of the topic that may prove useful in the application of said MISB documentation.


Electro-Optical Motion Imagery
Advanced High Definition
≥ 1920 pixels
≥ 1080p lines
48 - 120 Hz
L14 - L12 MISM
High Definition (HD)
STD 9710, RP 9720b
1280 -1920 pixels
720 - 1080p lines
24 - 60 Hz
L11 - L9 MISM
Enhanced Definition
STD 9811, RP 9720c
640 - 960 pixels
480 - 576p lines
24 - 60 Hz
L8 - L6 MISM
Standard Definition
STD 9702, 9705, 9719, RP 9720d
640 - 720 pixels
480 - 576i lines
24 - 60 Hz
L5 - L3 MISM
Low Bandwidth MI
RP 9720e
640 - 720 pixels
480 - 576i lines
24 - 30 Hz
L2.2 - L1.0 MISM
Very Low Temporal MI
RP 9720f
720 - 1920 pixels
480 - 1080 lines
Still - 2 Hz
L0 MISM
Compression
Uncompressed
H.264/AVC
STD 9701 (SD)
STD 9723 (HD)
STD 0202 (ED)
EG 0802
EG 0904
MPEG-2
STD 9601, 9701 (SD)
STD 9704 Conversions
STD 9723 (HD)
STD 0202 (ED)
Video NIIRS
RP 0901
File/Transport
MPEG-2 TS
STD 9701
SDI HD, SD
STD 9703
Tape Servers
STD 9707
KLV in SMPTE 291
STD 9716
KLV in AES3
STD 9718
SDI Interface
STD 9803
Fiber Optic
STD 9901
SDI ED
STD 0201
ASPA
STD 0301
KLV in MPEG2 TS
RP 9717
Tape Formats
RP 9721
DV Format
RP 9902
MPEG-2 Systems
RP 0101
AAF
RP 0106
MXF
RP 0107
RTP
RP 0804
Low BW Video
EG 0803
STANAG 4559 Model
EG 0813
Timing & Synchronization
Imbedded Time Ref
STD 9708
Time Stamping
STD 0604
Time Code Embedding
STD 9714
Common Time Ref
STD 0603
Time Synchronization
STD 9715
Inserting Time Code
STD 0605
Metadata
Closed Captioning
STD 9709
Annotation Set
RP 0602
Predator UAS Set
EG 0104
Geospatial Metadata
STD 9711
MI Identifier
RP 0608
MISB Registry
EG 0607
Content Description
STD 9712
CMS: Structure
RP 0701
Photogrammetry
EG 0801
KLV Data Encoding
STD 9713
Ancillary Text
RP 0808
CoT
EG 0805
Security Set
STD 0102
VMTI LDS
RP 0903
RVT Local Set
EG 0806
Bit / Byte Order
STD 0107
Range Image Set
EG 1002
Meteorological
EG 0809
UAS Local Set
STD 0601
Audio Encoding
EG 1001
LVSD Applications
EG 0810
Metadata Dictionary
STD 0807
Minimum Set
STD 0902


Infrared Motion Imagery
Super High Definition
2048 - 3840 pixels
1152 - 2160 lines
25 - 60 Hz
L18 - L16 IRSM
Very High Definition
RP 0401e
1920 -2048 pixels
1080 - 1152 lines
25 - 60 Hz
L15 - L13 IRSM
High Definition
RP 0401d
1024 - 1280 pixels
720 - 1024 lines
25 - 60 Hz
L12 - L10 IRSM
Medium Definition
RP 0401c
640 - 720 pixels
480 - 576 lines
25 - 60 Hz
L9 - L7 IRSM
Low Definition
RP 0401b
320 - 360 pixels
240 - 288 lines
25 - 60 Hz
L6 - L4 IRSM
Very Low Definition
RP 0401a
160 - 180 pixels
120 - 144 lines
25 - 60 Hz
L3 - L1 IRSM
Compression
Capture
RP 0402
H.264/AVC
STD 0404
EG 0802
MPEG-2
STD 0404
File/Transport
MPEG-2 TS
STD 9701
Parallel Interface
STD 0402
Serial Interface
STD 0403
KLV in SMPTE 291
STD 9716
KLV in AES3
STD 9718
ASPA
STD 0301
KLV in MPEG2 TS
RP 9717
MPEG-2 Systems
RP 0101
AAF
RP 0106
MXF
RP 0107
RTP
RP 0804
Low BW Video
EG 0803
Timing & Synchronization
Imbedded Time Ref
STD 9708
Time Stamping
STD 0604
Time Code Embedding
STD 9714
Common Time Ref
STD 0603
Time Synchronization
STD 9715
Inserting Time Code
STD 0605
Metadata
Annotation Set
RP 0602
Predator UAS Set
EG 0104
Geospatial Metadata
STD 9711
MI Identifier
RP 0608
MISB Registry
EG 0607
Content Description
STD 9712
CMS: Structure
RP 0701
Photogrammetry
EG 0801
KLV Data Encoding
STD 9713
Ancillary Text
RP 0808
CoT
EG 0805
Security Set
STD 0102
RVT Local Set
EG 0806
Bit / Byte Order
STD 0107
Meteorological
EG 0809
UAS Local Set
STD 0601
Audio Encoding
EG 1001
Metadata Dictionary
STD 0807
Minimum Set
STD 0902


Electro-Optical Motion Imagery
Mega-Pixel Camera Array
RP 1001
320 - 1920 pixels
240 - 1080p lines
2 - 30 Hz
L9 - L1 MISM
Compression
JPEG2000
RP 0606
RP 0705
File/Transport
JPIP Profile
RP 0811
Timing & Synchronization
TBD
Metadata
Profile 2: Applications
EG 0810

Example: ***Unmanned System Interoperability Profile (USIP) 1***



Motion Imagery

Motion Imagery is defined as imagery [a likeness or representation of any natural or man-made feature or related object or activity] utilizing sequential or continuous streams of images that enable observation of the dynamic, (temporal), behavior of objects within the scene. Motion Imagery temporal rates—nominally expressed in frames per second—must be sufficient to characterize the desired dynamic phenomena. Motion Imagery is defined as including metadata and nominally beginning at frame rates of 1 Hz (1 frame per second) or higher within a common field of regard. Full Motion Video (FMV) falls within the context of these standards. Within motion imagery, the following domains are currently specified:

- Electro Optical (including video and television)
- Infrared (including low-light television)
- LVSD – Large Volume Streaming Data
- Multispectral (MSI) / Hyperspectral (HSI)

Motion Imagery Standards Profile Applicability to DoD/IC/NSG Communities

The MISP is applicable to all DoD/IC/NSG motion imagery systems that are subject to the DoD Joint Technical Architecture and the NSG Technical Architecture. All new motion imagery systems are required to be compliant with provisions of the MISP as soon as practical. All analog motion imagery systems are considered to be legacy systems as of 12 June 1997. In accordance with the MISP, all new systems are required to be based on digital motion imagery technology.

MISP Compliance

Motion Imagery Standards Profile (MISP) compliance is based upon compliance to a specified approved version of the MISP. The motion imagery system supplier specifies the MISP version for which it is seeking compliance (only MISP 4.4 and newer versions are testable by the JITC- Joint Interoperability Test Command) along with three qualifications: the MISM-Level for video compression, the file format for transport or storage, and the metadata RP/EG/STDs used. MISM levels are as defined per the MISP version specified by the system supplier. All signals tested are assumed digital. Metadata is tested for compliance to the specified version of the MISP and respective EG's/RP's. Draft RPs/EGs will not be tested until approved by the MISB. The motion imagery system may include other MISB RPs/EGs of their choice including, for example, RP 0608, RP 0602 and/or RP 0103, although these are not required for compliance. In addition, Security metadata shall comply with MISB Standard 0102.